

WHAT IS CLAIMED IS:

1. A melt spinning apparatus for spinning continuous polymeric filaments comprising:
 - 5 (a) a spinneret having a plurality of capillaries;
 - (b) a polymer delivery source which is arranged to communicate with said spinneret and deliver molten polymer therethrough to produce a continuously moving array of molten polymeric filaments corresponding to
 - 10 the arrangement of capillaries in the spinneret;
 - (c) a quench zone positioned below said spinneret and arranged to receive and cool the array of molten filaments as they move therethrough by passing a cooling gas inward with respect to the array of moving
 - 15 filaments; and
 - (d) a finish applicator positioned inside or below the quench zone to apply an amount of finishing liquid to the array, wherein said finish applicator comprises
 - 20 (i) a base plate having a peripheral edge which corresponds to the cross-section of the array of moving molten filaments; and
 - (ii) a body portion having a top and bottom concentric therewith and connected to said base plate, wherein said bottom corresponds in shape to the shape
 - 25 defined by the peripheral edge of the base plate, and the surface formed by a plurality of lines drawn between said top and said bottom tapers outwardly with respect to the direction of movement of the filament array]. The apparatus of claim 1, further comprising
 - 30 a means for moving the finish applicator into and out of the array of filament.
3. The apparatus of claim 1, wherein said quench zone is a radial, cross-flow, or pneumatic quench zone.
- 35 4. The apparatus of claim 1, wherein said applicator is a conical-shaped finish applicator.

5. The apparatus of claim 1, wherein the finish applicator includes a filament contact surface coated with ceramic oxide.

5 6. The apparatus of claim 1, wherein said finish applicator comprises one or more peripheral finish delivery slots that communicates with a peripheral fiber contact surface.

10 7. The apparatus of claim 1, wherein said finish applicator is positioned a distance ranging from 120 mm to 200 mm below said spinneret.

15 8. The apparatus of claim 1, wherein said finish applicator is positioned a distance ranging from 200 mm to 400 mm below said quench zone.

20 9. The apparatus of claim 1, wherein the array of the filaments being annular comprise an inner and an outer filament array diameter that determine the diameter of said finish applicator in a range of 70% to 120% of the outer filament array diameter.

25 10. A melt spinning apparatus for spinning continuous polymeric filaments, comprising a finish applicator to apply an amount of finishing liquid to an array of filaments, positioned inside or below a quench zone that is arranged to receive a stream of cooling gas directed radially inward, wherein said finish applicator comprises

30 (i) a base plate having a peripheral edge which corresponds to the cross-section of the array of moving molten filaments; and

35 (ii) a body portion having a top and bottom concentric therewith and connected to said base plate, wherein said bottom corresponds in shape to the shape defined by the peripheral edge of the base plate, and the surface formed by a plurality of lines drawn

between said top and said bottom tapers outwardly with respect to the direction of movement of the filament array.

5 11. An applicator for applying finish to a moving expanded polymeric filament array comprising a base plate having a peripheral edge which corresponds to the cross-section of the filament array and a body portion having a top and bottom concentric therewith and
10 connected to said base plate, wherein said bottom corresponds in shape to the shape defined by the peripheral edge of the base plate, and the surface formed by a plurality of lines drawn between said top and said bottom tapers outwardly with respect to the
15 direction of movement of the filament array.

12. The applicator of claim 11, which further comprises a peripheral delivery slot for delivering finish to the expanded filament array, and wherein said
20 peripheral delivery slot communicates with a peripheral fiber contact surface on an outer surface of the body portion.

13. The applicator of claim 12, further comprising an
25 arm having channels for delivery and drainage of said finish, wherein said arm supports said applicator and further wherein said arm is connected to said peripheral delivery slot.

30 14. The apparatus of claim 11, wherein said applicator is mounted on a linear motion device.

15. A melt spinning process for spinning continuous polymeric filaments, comprising:
35 passing a polymeric melt through a spinneret to form an array of polymeric filaments;

passing the filament array to a quench zone and providing a cooling gas directed inward toward said array to cool the filaments;

5 passing said filaments over a finish applicator positioned in or below said quench zone and arranged to contact the filaments and to deliver finish to the filaments.

10 16. The process as claimed in claim 15, further comprising forming the filaments into yarn.

15 17. The process as claimed in claim 15, wherein the finish applicator includes a tapered geometry to remove entrained cooling gas and to retain inter-filament separation of the filament array.

18. The process as claimed in claim 15, wherein the polymeric filaments comprise polyester.

20 19. The process as claimed in claim 18, wherein said polyester comprises a bicomponent polyester.

25 20. The process as claimed in claim 19, wherein said bicomponent comprises a first component selected from the group consisting of poly(ethylene terephthalate) and copolymers thereof and a second component selected from the group consisting of poly(trimethylene terephthalate) and copolymers thereof.

30 21. The process as claimed in claim 20, wherein the first component and the second component are present in a weight ratio of 70:30 to 30:70.

35 22. A process for applying finish to an expanded array of polymeric filaments, comprising contacting said filaments with a wetted tapered surface of a finish applicator.

L. 126 -

21. Filaments produced according to the process of claim 15, wherein the inter-filament coefficient of variation for linear density of the filaments is less than 6%.

5

22. Filaments produced according to the process of claim 15, wherein the sample variability of gravimetric finish level is less than 6% as measured by %CV.

10

23. Yarn produced by the process of claim 16.

24.

Polyester filaments produced by the process of claim 15.